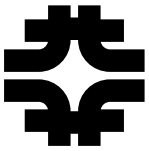

Fermi National Accelerator Laboratory

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CDF

Measurement of Time-Dependent B^0 - $\bar{B}^0$ Flavor Oscillation at CDF

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Measurement of Time-Dependent $B^0 - \overline{B}^0$ Flavor Oscillation at CDF. [1]

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Abstract

The time dependence of $B^0 - \overline{B}^0$ oscillations has been studied using several techniques by the CDF experiment at Fermilab. The data comprise $110\,pb^{-1}$ of $p\overline{p}$ collisions at $\sqrt{s} = 1.8\,TeV$. Preliminary measurements of the $B^0 - \overline{B}^0$ oscillation frequency (Δm_d) will be presented.

[1] Talk presented at the EPS 97 conference, held on 19-26 August 1997 in Jerusalem.

911: Measurement of Time-Dependent $B^0 - \overline{B}^0$ Flavor Oscillation at CDF.

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Abstract. The time dependence of $B^0 - \overline{B}^0$ oscillations has been studied using several techniques by the CDF experiment at Fermilab. The data comprise $110\,pb^{-1}$ of $p\overline{p}$ collisions at $\sqrt{s} = 1.8\,TeV$. Preliminary measurements of the $B^0 - \overline{B}^0$ oscillation frequency (Δm_d) will be presented.

Large samples of B hadron decays are selected using the following triggers:

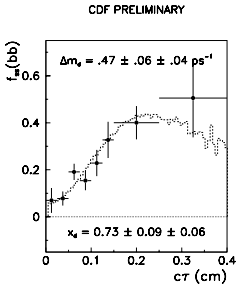
1. inclusive single lepton (e, μ). The transverse momentum threshold is about $8\,GeV/c$.
2. dilepton ($e\,\mu$; $\mu\,\mu$). The transverse momentum threshold is $2\,GeV/c$ for the dimuon trigger; for the other trigger it is $5\,GeV/c$ for the electron and $2.5\,GeV/c$ for the muon.

Four analyses are presented here for the $B^0 - \overline{B^0}$ mixing: two of them use the single lepton triggers, and the other two use dilepton triggers.

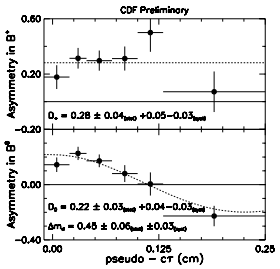
Jet Charge inclusive lepton analysis : the sign of the trigger lepton tags the flavor of the B at decay time; the flavor at production is obtained either from the sign of the other lepton, if another lepton is found, or from the the sign of jet charge:

$$Q_{jet} = \frac{\sum_i q_i (\mathbf{p}_i \cdot \mathbf{a})}{\sum_i (\mathbf{p}_i \cdot \mathbf{a})}$$

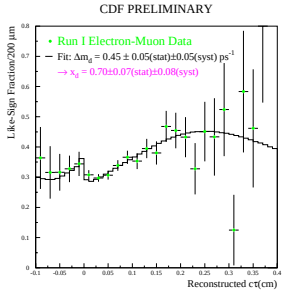
where $\mathbf{a}$ is the jet axis, and the sum is over the tracks in the jet.
The result obtained is: $\Delta\mathbf{m} = \mathbf{0.47 \pm 0.06\,(stat) \pm 0.04\,(syst)\ ps^{-1}}$.



$\mathbf{l + D^{(*)}}$ with Same Side Tagging : the lepton trigger tags the flavor of the B at decay time; the flavor at production is obtained from the sign of the track, selected on the same side, which has the minimum transverse momentum with respect to the $l^- D^*$ system, and is within a 0.7 cone in $\eta - \phi$. In fact, $\overline{B}^0_d$ (B^0_d) mesons are expected to be produced in association with π^- (π^+), as also would happen if they were produced from B^{**} resonances. Several channels are used to reconstruct D^*'s.
The result obtained is: $\boldsymbol{\Delta m = 0.45 \pm 0.06\,(stat) \pm 0.03\,(syst)\,ps^{-1}}$.



$\mathbf{e - \mu}$ analysis : the sign of the lepton on the side where the secondary vertex is found tags the flavor of the B at decay. The sign of the other lepton is used to tag the flavor at production.
The result obtained is: $\boldsymbol{\Delta m = 0.45 \pm 0.05\,(stat) \pm 0.05\,(syst)\,ps^{-1}}$.



$\mathbf{l}$ vs $\mathbf{l + D^{(*)}}$: the flavor tag of the B is the same as in the $e - \mu$ analysis, but in this case the $D^{*\pm}$ is fully reconstructed, through several channels.
The result obtained is $\boldsymbol{\Delta m = 0.51 \pm 0.10\,(stat) \pm 0.04\,(syst)\,ps^{-1}}$.

The CDF average value, obtained by combining the above four results, is $\boldsymbol{\Delta m = 0.464 \pm 0.030\,(stat) \pm 0.026\,(syst)\,ps^{-1}}$.